



NMFS Science Update

March 2017 MAFAC Meeting

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With help from:
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Stock Assessment Prioritization Process

Stock Assessment Improvement Plan

National Climate Science Strategy

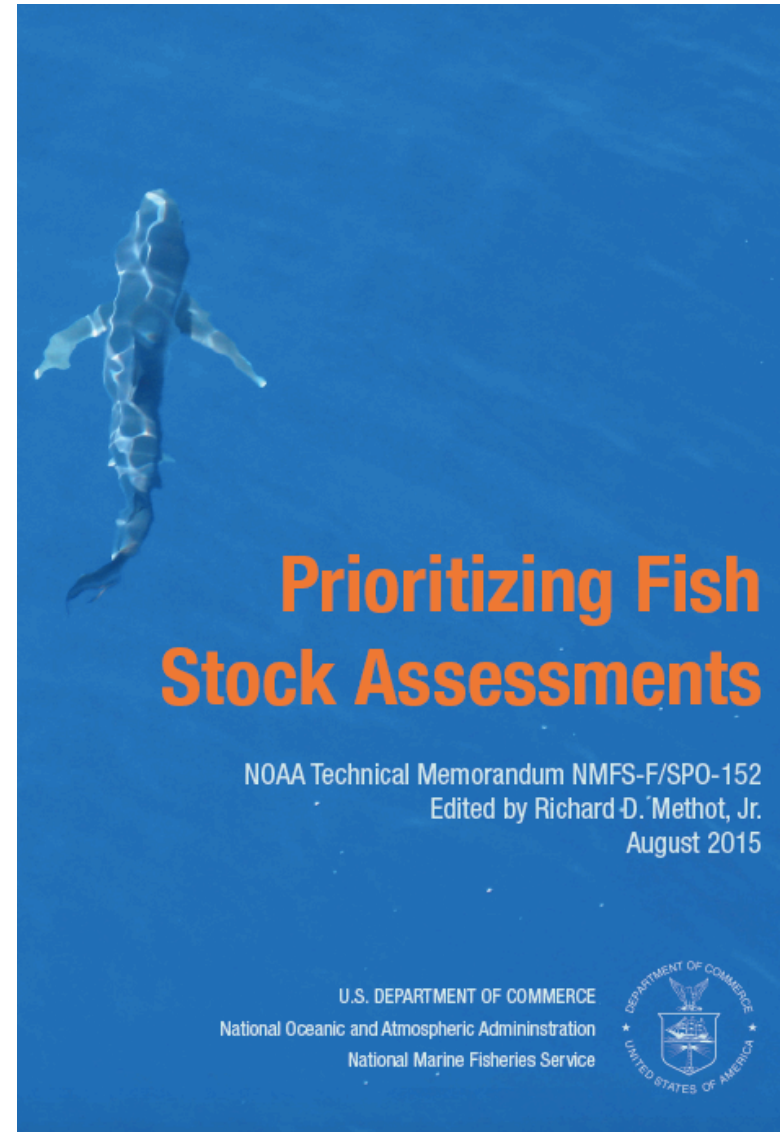
Management Strategy Evaluations

Citizen Science

Why stock assessment prioritization?

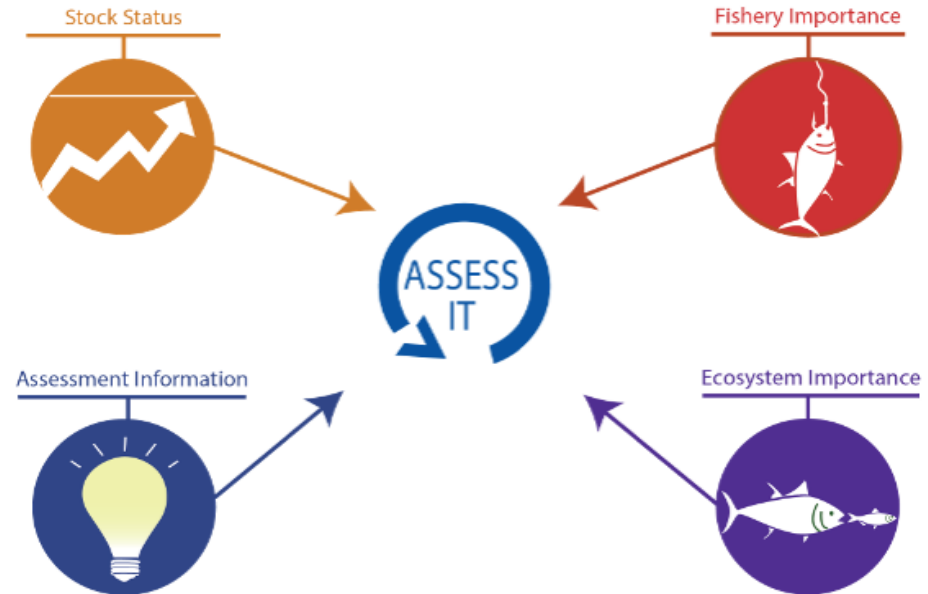
Data collection and analysis activities constitute a significant portion of the NMFS budget, but resources are insufficient to assess all managed stocks each year (nor is this a realistic target).

It is therefore important to provide a transparent, quantitative, and objective process for determining what appropriate assessment targets are, and how to best meet those targets by determining priorities for assessment.



Stock Assessment Prioritization

- Tool for regions to systematically investigate annual assessment needs
- Results are advisory (non-binding)
- Implemented on a regional basis
 - Purpose: support wise allocation of resources within a region
 - Results do not support redistribution of resources between regions or to non-assessment activities



Regional Prioritization Implementation



Role of MSEs in prioritization

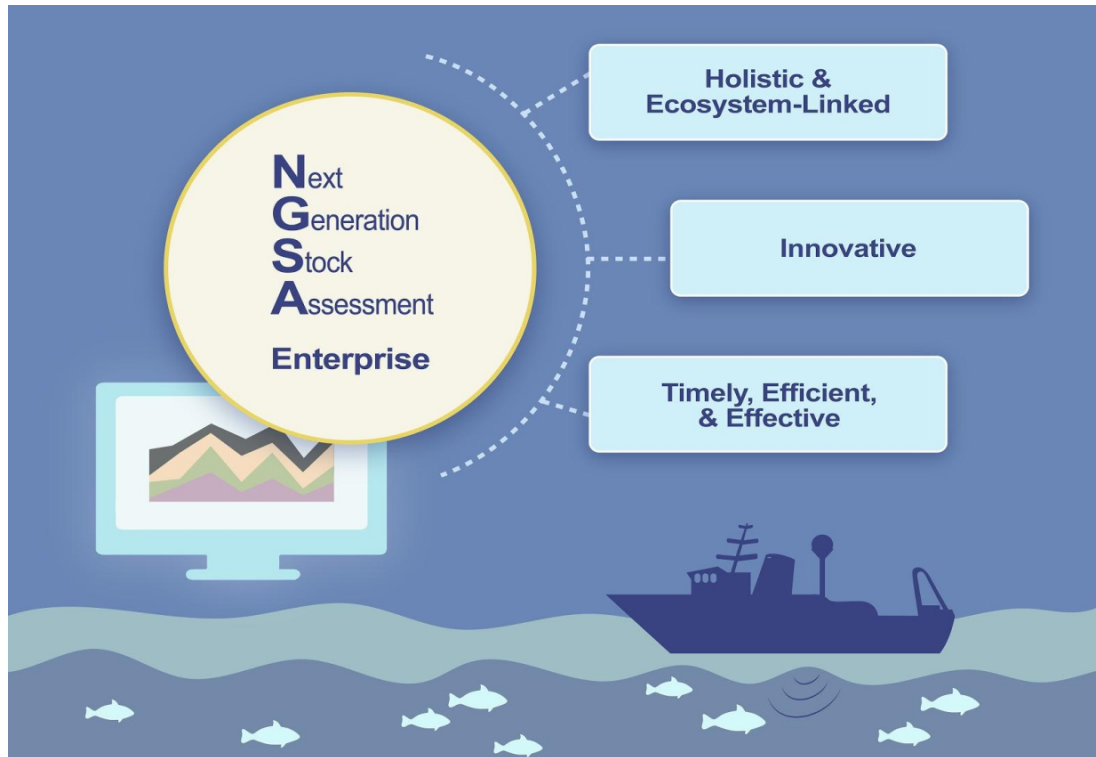
- Management strategy evaluations (MSEs) will be an important tool to refine the prioritization process; they can be used to simulate the whole data-assessment-management process.
- MSEs provide a systematic way to more completely include economic considerations into the prioritization process that accounts for the costs of assessments and the marginal benefits.
- This would help better understand the implications of stock variability, assessment imprecision, assessment frequency, and time lags between assessment and management implementation.

Prioritization Implementation Updates

Council	Status	Comments
PFMC	<i>Complete</i>	Used to schedule 2017 groundfish assessments
NPFMC	<i>In progress</i>	Frequency changes provisionally adopted; Plan Teams will begin work on MSE to evaluate proposed changes
WPFMC	<i>Initiated</i>	Data gathering is underway
NEFMC/ MAFMC	<i>Initiated</i>	Ongoing discussions on coordination between two Councils via NRCC
SAFMC	<i>In progress</i>	Prioritization scores awaiting SSC review/expert input; rankings will be used to guide SEDAR planning
GMFMC	<i>Initiated</i>	Data gathering is underway
CFMC	<i>On hold</i>	Initiated with Council but awaiting new Fishery Ecosystem Plans

STOCK ASSESSMENT IMPROVEMENT PLAN (FY17)

Implementing a Next Generation Stock Assessment Enterprise — *An Update to NOAA Fisheries' 2001 Stock Assessment Improvement Plan*



With ecosystems shifting into previously unobserved states, quasi-equilibrium contemporary stock assessments are not prepared to deal with shifts in stock productivity. Single-species approaches fail to account for the cumulative effects of fishing on multiple stocks in a regional ecosystem.

Advanced assessments:

- 1) ascribe the catch to age ranges of fish affected by the fisheries;
- 2) account for year-to-year fluctuations in body growth and the number of young fish entering the stock; and
- 3) direct evidence of the total mortality levels represented by the rate of decline in the numbers of older fish.

STOCK ASSESSMENT IMPROVEMENT PLAN

(Recently distributed for public comment and Councils and target to publish in FY17)

New strategic guidance that...

- Focuses on current issues & resource capacity
- Capitalizes on recent scientific advances
- Aligns with current legal mandates

Major elements of the new plan

- Expand scope of some assessments (ecosystem and economic linkages)
- Use new data collection & modeling technologies
- Refine 2015 prioritization process to help tailor assessment level/scope and support data gap analyses
- Enhance separation between assessment research and more streamlined operational (applied) assessments

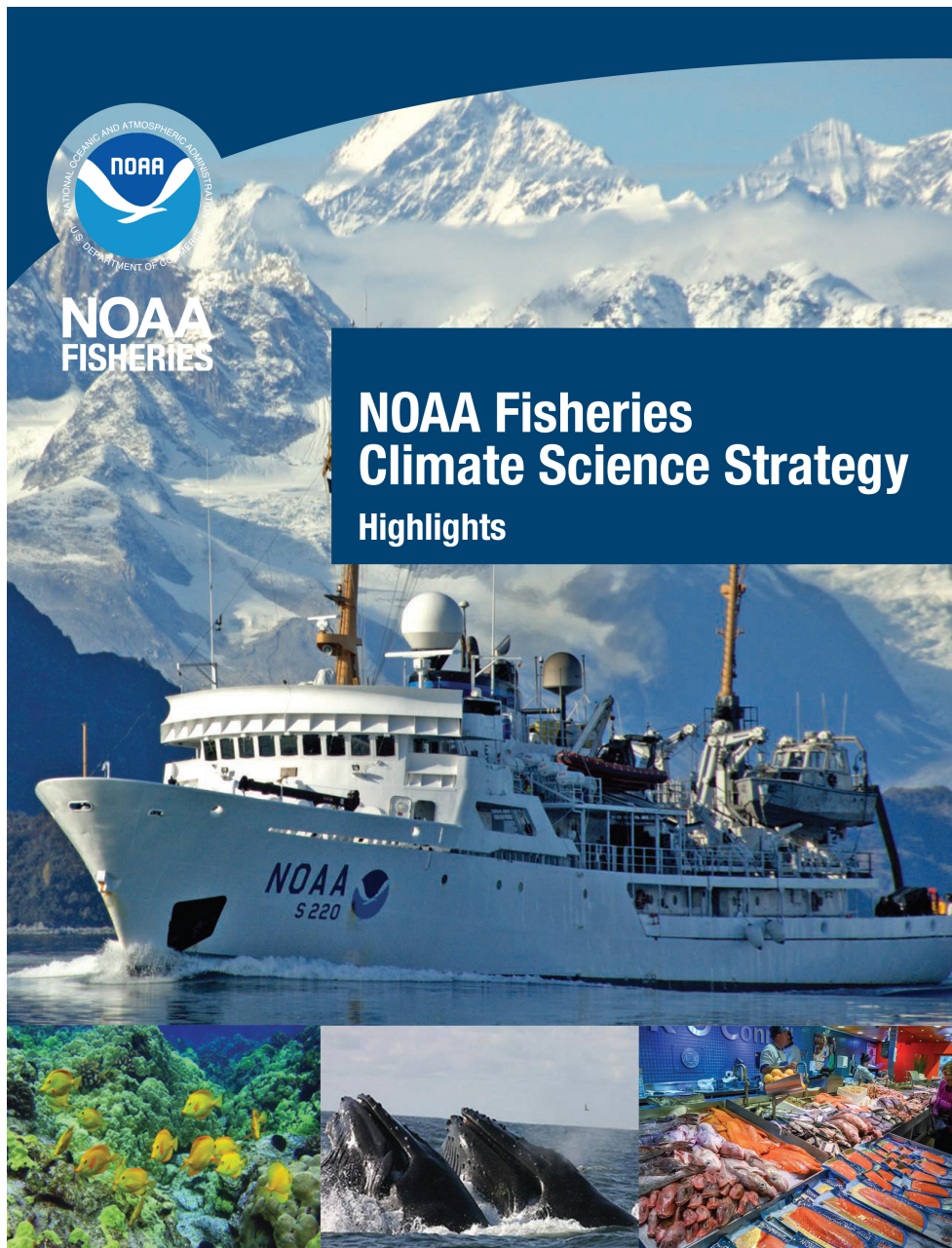
DRAFT



U.S. DEPARTMENT OF COMMERCE

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3 REPORT NUMBER #####
4 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
5 SILVER SPRING, MD 20910
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7 **IMPLEMENTING A NEXT GENERATION STOCK ASSESSMENT**
8 **ENTERPRISE**
9 *AN UPDATE TO NOAA FISHERIES' STOCK ASSESSMENT IMPROVEMENT PLAN*
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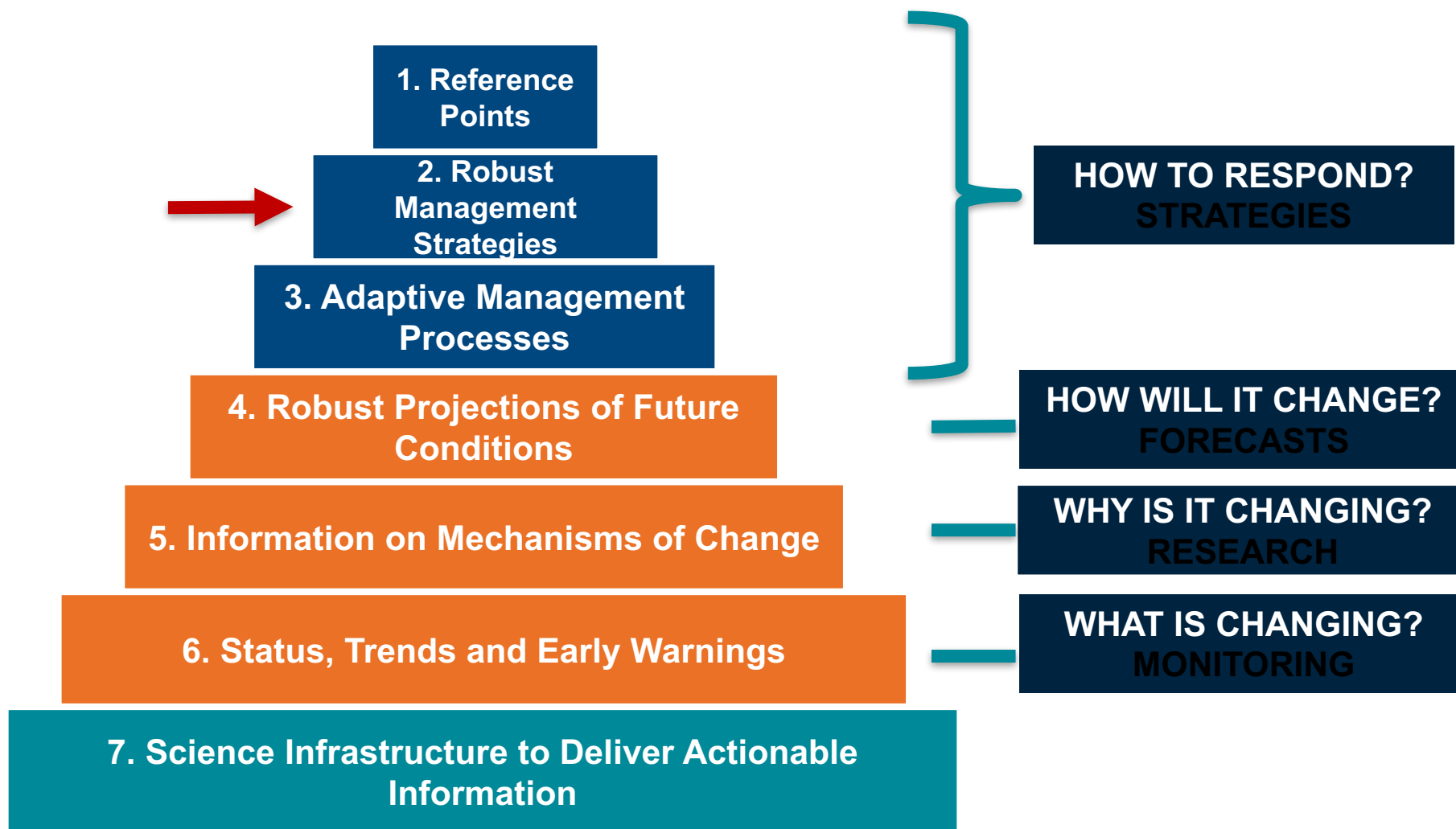




Goal:
**Increase the
production,
delivery and use
of climate-related
information
to fulfill
NOAA Fisheries
mandates**

www.st.nmfs.noaa.gov/ecosystems/climate

NOAA Fisheries Climate Science Strategy identifies information needed to respond

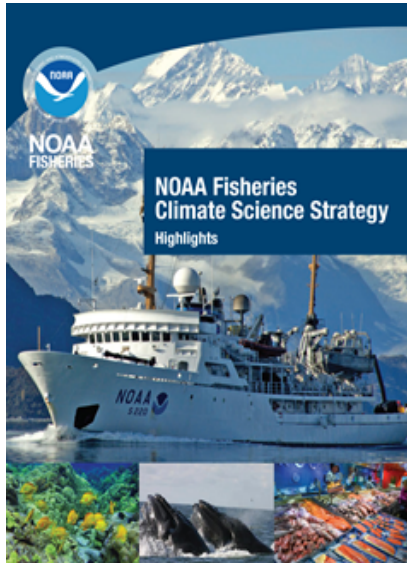


NMFS Climate Science Strategy

Climate Science Regional Action Plans

- Over 200 actions to support climate-ready fisheries management

Published Aug. 2015



Nearly complete in all regions

RESULTS:

*Critical
Information*

*Climate-
Ready
Management*

*Resilient
Resources &
Communities*

NMFS Climate Science Strategy: Key actions

WHAT IS CHANGING?

- ✓ Maintain existing monitoring of key fisheries and ecosystem conditions
- ✓ Track distributions of over 650 fisheries related species
- 👉 Strengthen Ecosystem Status Reports and early warnings

WHY & HOW WILL IT CHANGE?

- ✓ Fish Stock Vulnerability Assessments (Northeast, Bering Sea, California Current)
- ✓ Launch new Fish Stock Vulnerability Assessments (Pacific Islands, Gulf of Mexico)
- ✓ Climate and fisheries research to inform Stock Assessments
- 👉 Improve Fishing Community Vulnerability Assessments
- 👉 Improve forecasts of changing oceans and fish stocks (e.g., Pacific Hake, Sea Scallop)

HOW TO RESPOND?

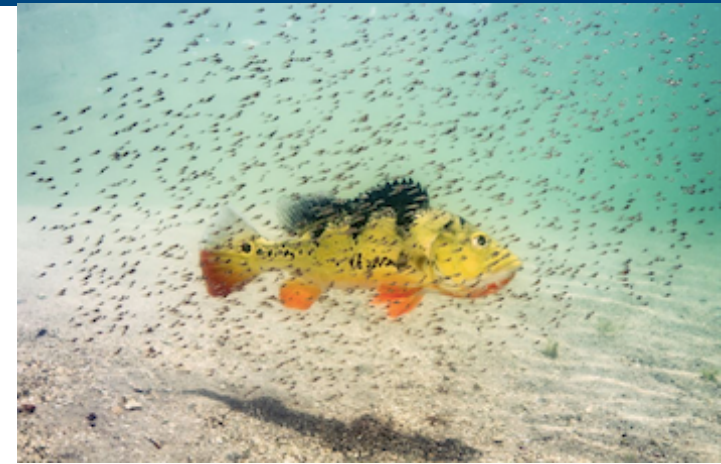
- ✓ Build capacity for Management Strategy Evaluations in each region
- 👉 Evaluate future scenarios and fishery management strategies (e.g., Alaska & West Coast)

Management Strategy Evaluations (MSEs)

- Management Strategy Evaluation (**MSE**) is a modelling tool to evaluate sufficiently realistic simulation of potential policy choices – management strategies – in complex systems.
- **MSEs** are designed to simulate physical, biological, management, and societal systems such that their effects on policy goals and societal objectives can be measured.
- There is a demand from both NMFS Regional Offices and from Fishery Management Council's for **MSE** support.

Roles and Responsibilities

MSE is at the interface between science and decision-making.



Scientists:

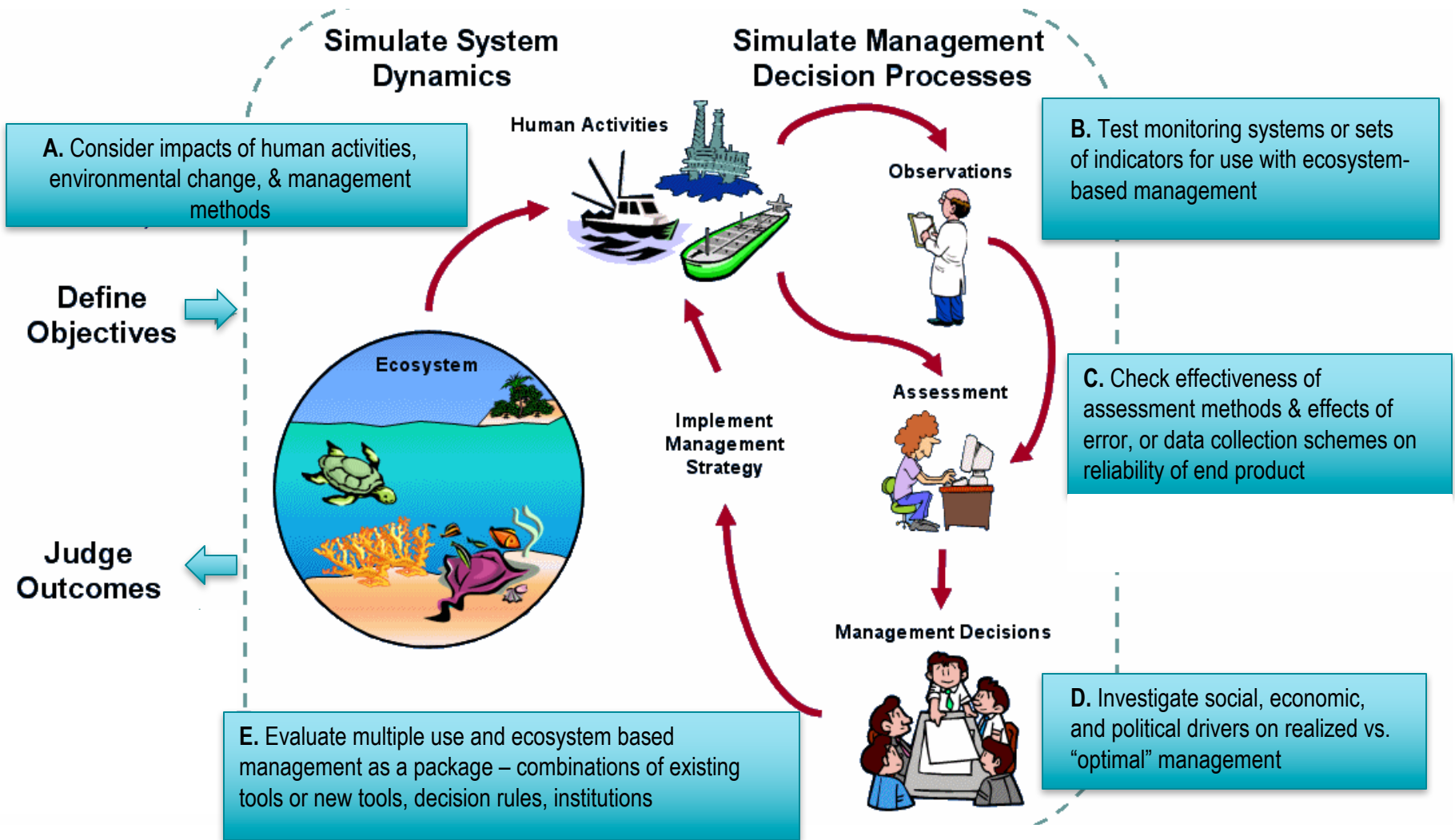
- Identify the hypotheses to represent in the operating model.
- Represent the objectives of the decision makers quantitatively.
- Identify factors which could be used in management strategies.

Stakeholders / decision makers / advocates:

- Identify management objectives (note this may be a function of legislation / court decisions, etc.)
- Identify candidate management strategies
- Make decisions on the final management strategy (policy call)

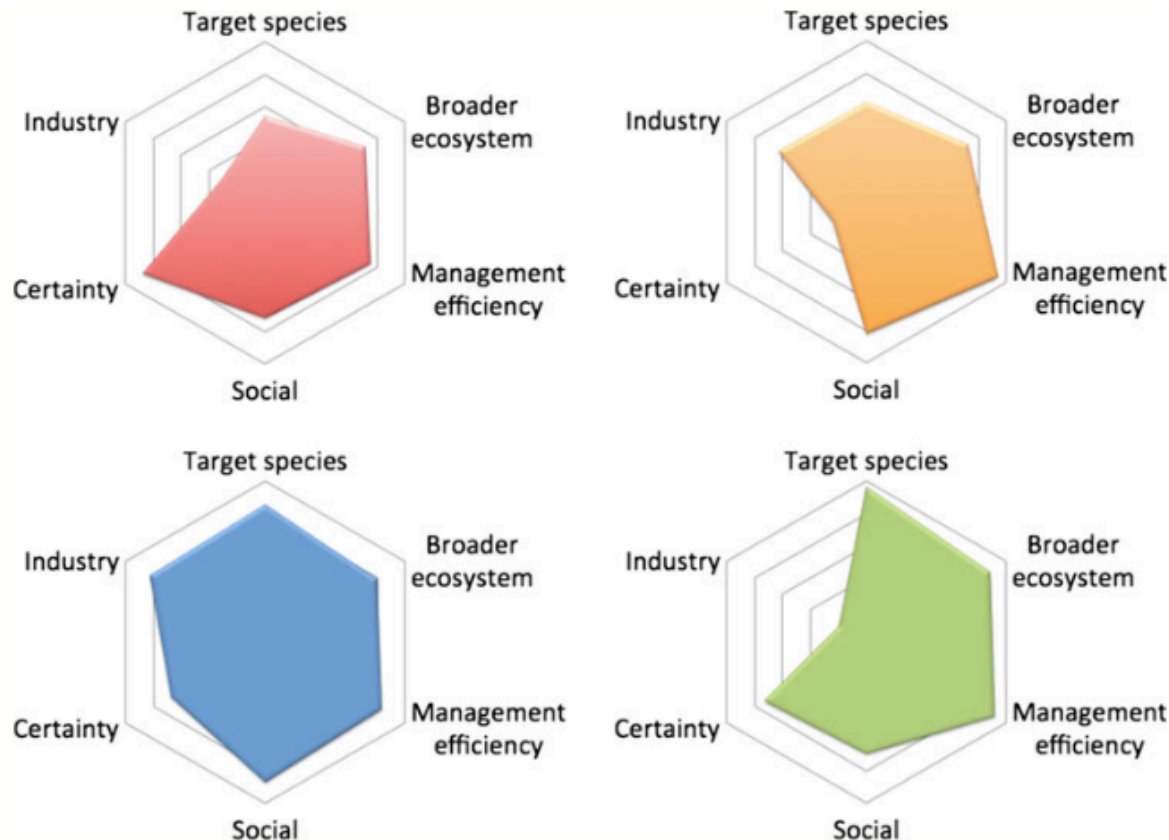


Implementation of MSE



Evaluation of Trade Offs

- MSE uses simulation to **evaluate the trade-offs of the alternative strategies and assesses the consequences of uncertainty for achieving the management goals.**
- Its usefulness depends on how the uncertainty is represented, and how the results of simulations are presented to the decision-makers.



Punt et al. (2014)

Advantages

Disadvantages

- Having a management strategy makes decision making easier.
 - Forces explicit consideration of objectives.
 - Explicit focus on uncertainty and robustness – not optimal performance.
- Development can be lengthy.
 - Stakeholders may not wish to state their objectives.
 - Some strategies are constrained by law.

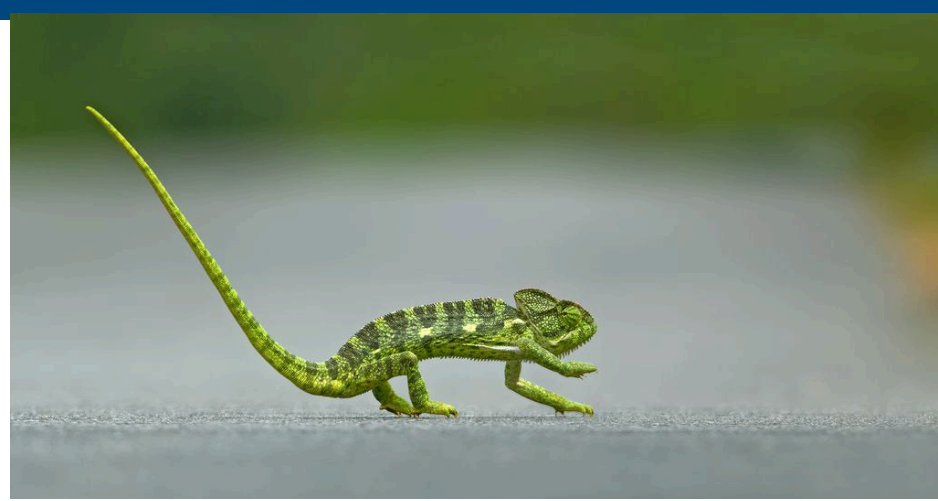
A National MSE Vision



A national MSE capability with complementary expertise at each Science Center to advance the science and utilization of MSEs to inform management decisions across NMFS that can be applied to fisheries management, protected resources, habitat, ecosystem and economic issues.

Next steps

- A strategy is underway to provide staff time for cross-Science Center development of MSE's
- At least one MSE subject matter expert needs to be available (*new hires*) at each Science Center
- A National WG formed of these MSE experts can support implementation of the strategy

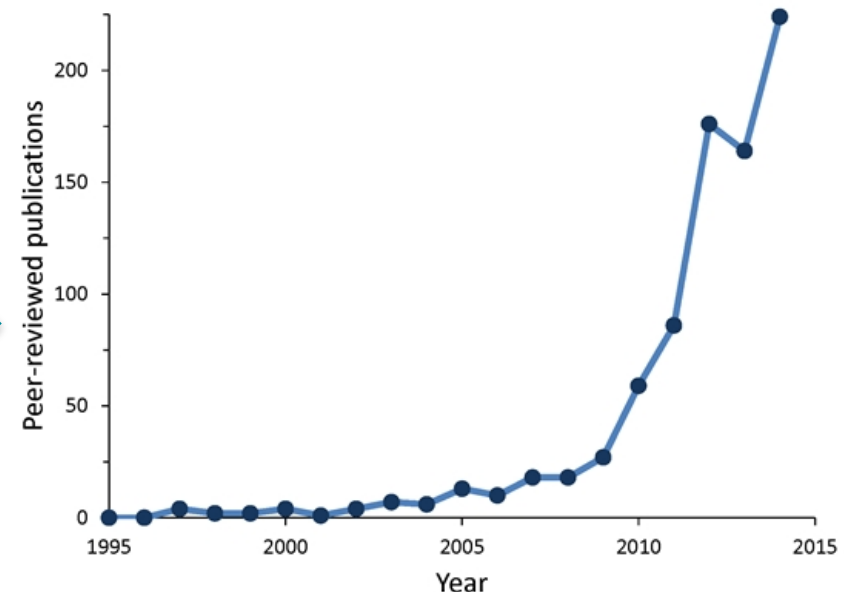


CITIZEN SCIENCE OVERVIEW

Government-Wide and NOAA:

- Crowdsourcing and Citizen Science Act January 2017
- Federal Community of Practice: > 40 agencies
- NOAA citizen science community: > 160 members

Web of Science Search Results for
keyword “citizen science”



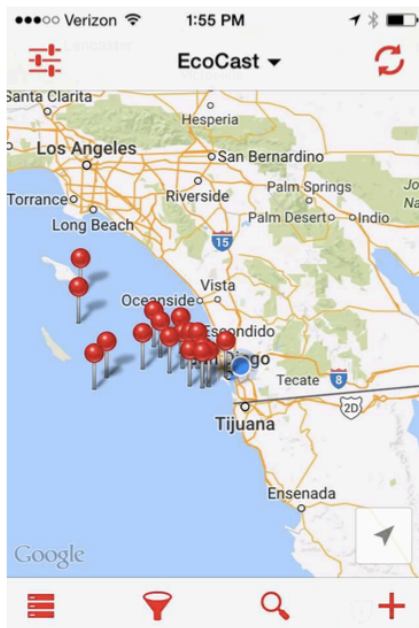
DEFINITIONS

Citizen science: Projects in which volunteers partner with scientists to answer real world questions

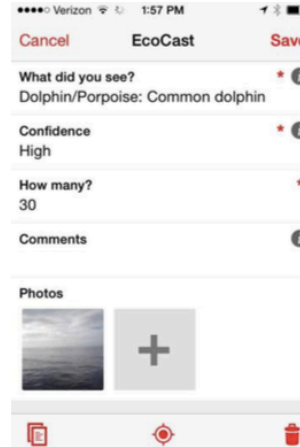
Crowdsourcing: When an agency or program calls or solicits openly for voluntary assistance from a large group of individuals

CITIZEN SCIENCE AT NOAA FISHERIES

- Full inventory of efforts (to be completed mid-April)
- Crowdsourcing project: Innovation in Government award?
- Role in draft South Atlantic (Climate) Regional Action Plan
- Includes apps (e.g., Dolphin and Whale 911, EcoCast)



The EcoCast application interface can be easily downloaded on any mobile device. The same application can be used to record opportunistic sightings and will also provide real-time ocean condition information.



EcoCast Application Interface

SUPPORTING RESOURCE MANAGEMENT

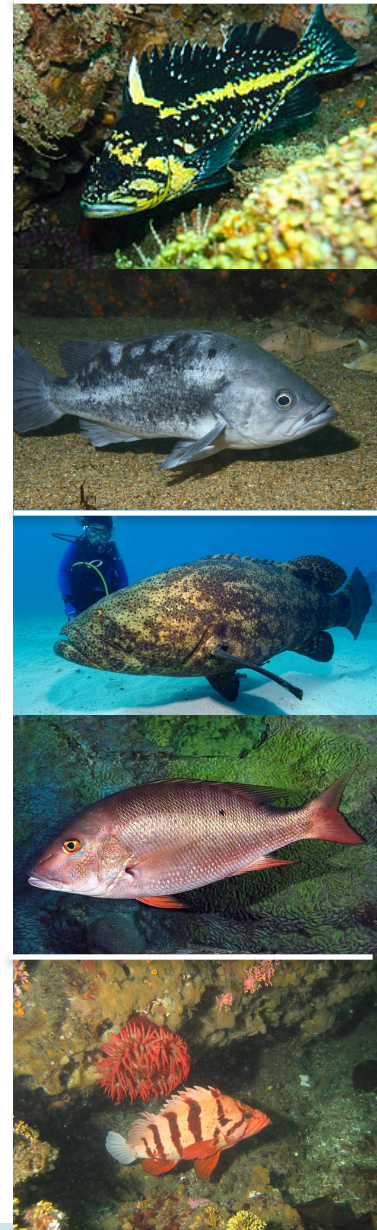
Stock Assessments

- California Collaborative Fisheries Research Program and West Coast rockfishes
- REEF data used in Gulf of Mexico/S. Atlantic goliath grouper, Caribbean mutton snapper assessments

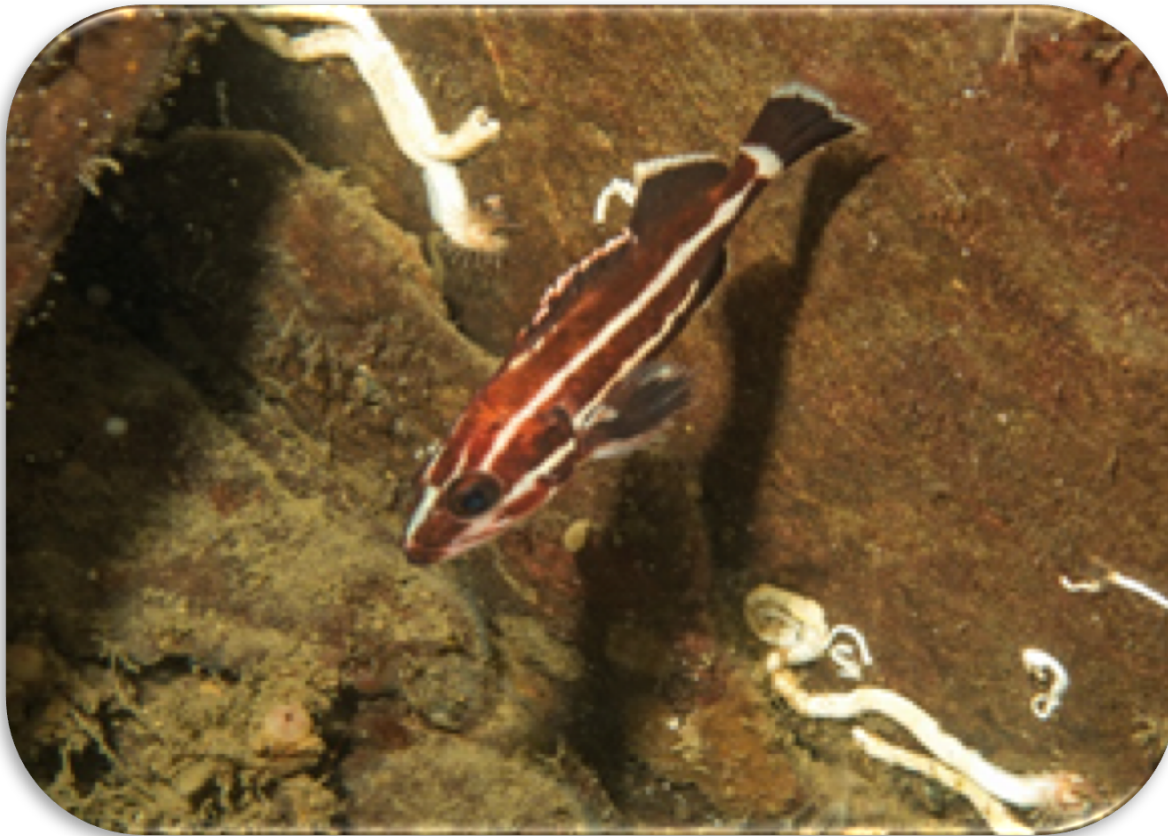
Protected Species

- REEF data used to help evaluate the population status of rockfish species in Puget Sound

Examples of current projects (follow)



YOUNG OF YEAR ROCKFISH SCUBA PROJECT



YOY YELLOWEYE ROCKFISH



CROWDSOURCING WESTERN ALEUTIAN SEA LION SCIENCE



www.zooniverse.org/projects/sweenkl/steller-watch

SAFMC and Citizen Science

- Developing Citizen Science Program
- Jan 16: Program Design Workshop → Blueprint
- Jul 16: Formed Council-Level Committee
- Dec 16: Designated full-time Council staff position
- They are actively working on next steps
- **Possible 1st project:** Develop app for fishermen to provide scamp discard information



Summary

- Citizen science efforts are on the rise government-wide and at NOAA Fisheries
- NOAA Fisheries is starting to undertake efforts to explore and assess the contributions of citizen science and crowdsourcing to living marine resource management



Thank you!

